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New records of scaleworms and their allies (Polychaeta: Aphroditoidea and Pisionoidea), from the Clyde and Argyll Sea Area, with notes on parasitic copepods, commensal entoprocts, and other epizoans

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ABSTRACT

New records are provided of 31 species of scaleworm (and allied taxa) collected over a period of years from the Clyde and Argyll Sea Area. The species *Pisione remota, Enipo elizabethae, Harmothoe antilopes, H. pagenstecheri, H. spinifera, Malmgrenia castanea, Malmgrenia ljungmani* and *M. marphysae* are newly recorded from the area, while *Harmothoe fragilis* is found for the first time from Scottish waters. The widespread occurrence of both *Pholoe inornata* and *P. baltica* in the area is confirmed. New records are also provided of parasitic copepods associated with scaleworms including *Selioides bocqueti, Herpyllobius polynoes, Herpyllobius arcticus*, and *Eurysilenium truncatum. E. truncatum* is confirmed for the first time from British waters. Additional records are cited for entoprocts, hydroids, bryozoans and stalked ciliates attached to specimens of *Gattyana cirrhosa* or *Aphrodita aculeata.* The entoproct *Loxosomella glandulifera* is recorded for the first time from British waters.

INTRODUCTION

The scaleworm families (Polynoidae, Acoetidae, Pholoidae, & Sigalionidae) and their allies the prongworms (Pisionidae) and the sea mice (Aphroditidae) are among the most readily recognisable of polychaete worms and are common in both intertidal and sublittoral habitats. They frequently occur in benthic macrofaunal monitoring surveys although many of these records remain hidden in unpublished environmental impact reports. The aim of this communication is to bring to light the records held by SEPA (South West Area) in line with the current interest in documenting marine biodiversity.

The records included here originate mostly from monitoring surveys carried out since 1990, undertaken by the authors under the then Clyde River Purification Board (CRPB) and since 1996 under the Scottish Environment Protection Agency (SEPA). Although numerous CRPB records prior to 1990 exist they are not cited except in a few cases where voucher specimens have been retained and identities verified by the present authors. All records between 1990 and 2007 are included plus a handful of later records for rarer species.

Unless otherwise stated, the surveys generally involved grabbing or coring of sublittoral seabed sediments, usually in association with monitoring industrial or sewage treatment works discharges or fish farm sites. Hence species from sublittoral substrates predominate while those from intertidal areas or rocky or stony habitats are poorly represented. However three infrequently recorded species were recovered from bundles of nylon mesh ("clam spat bags") moored subtidally for several months to assess settlement of scallop spat. The records for each species are arranged geographically, approximately north to south. For relatively common species only the general survey locations are given but more information on sampling stations are provided for less common species, with records from five or fewer survey occasions. For the latter, notes on the numbers per station are given and station details are shown in the appendix.

Specific identification of scaleworms generally requires microscopical examination and can be difficult especially with juvenile specimens or material fixed with formalin which is often damaged or incomplete. There have been numerous changes of nomenclature and taxonomy over the years, which make assessment of older records difficult. The works of Tebble & Chambers (1982) and Chambers (1985) on Scottish scaleworms, and the subsequent synopsis by Chambers & Muir (1997) on British scaleworms have added greatly to the knowledge of this group in UK waters. It is clear that the known distribution of scaleworms in British waters is still incomplete, especially in relation to some of the more recently recognised species. At least one species new to the British Isles has been found relatively recently in Northern Ireland (Chambers, 1989) and it is possible that this, or perhaps other new species, may yet be found in Scottish seas.

Useful notes on some of the species which occur in British waters, including reviews of the genus *Harmothoe* and *Malmgreniella* (*sic*), are provided in recent revisions of Mediterranean scaleworms by Barnich & Fiege (2000, 2001, 2003) and also the monograph on Arctic Polychaeta by Jirkov (2001). Pettibone (1993) introduced some differences in generic nomenclature such as using *Malmgreniella* for *Malmgrenia*. However the usage of *Malmgrenia* (for North Atlantic species) has recently been conserved by the International Commission on Zoological Nomenclature (ICZN, 2009). The nomenclature used here follows Chambers & Muir (1997) except for the genus *Pholoe* which was revised by Petersen (1998).

The polychaete records from the Clyde Sea Area were compiled by Clark (1960) as part of the Clyde Sea Fauna series and included notes on 28 scaleworm species and 3 allied aphroditid species from throughout the Firth of Clyde. Additional polychaete records for the Clyde and Argyll area can be found in McIntyre (1961), Clark & Dawson (1963), Pearson (1970, 1975), Gage (1972a,b) and Comely (1973). Many of these records were reviewed and amended by Tebble & Chambers (1982) and Chambers (1985).

The Clyde and Argyll marine census area, as depicted in Lincoln (1979), is larger than that of the Clyde Sea Fauna series incorporating the Firth of Clyde, including Loch Ryan, the western Kintyre peninsula, the Inner Hebrides, Loch Linnhe, and also part of the coast of Northern Ireland. This note includes records of 31 species of scaleworm (or allied taxa) including eight new to the area and one new to Scottish waters.

While scaleworms are well known as associates of other invertebrates (Pettibone, 1993) they also act as hosts to a range of parasitic copepod species, as well as harbouring other epizoans including entoprocts, bryozoans, hydroids and ciliates. New records of copepods and other epizoans associated with scaleworms and also with aphrotidid "sea mice" are provided. The epizoan species were identified with the aid of Hayward (1985), Hayward & Ryland (1990), Nielsen (1964, 1989), and Schuchert (2008).

Scaleworms and their allies (Pisionoidea and Aphroditoidea), from the Clyde and Argyll Sea Area

Family Pisionidae

Pisione remota (Southern, 1914)
Ayr Bay - Jul.94, 1 specimen at Stn.3, Girvan: Grangestone - Feb.92, 2 small grabs at each of Stns. 1, 2, 3, 5, 6, 7 (with 60, 8, 1, 2, 13, 4 specimens), Apr.92, 3 sediment cores at each of Stns. A2,B2,C2 (with 4,1,3 specimens), Campbeltown Loch - Jan.01, 8 at Stn. 10, 5 at Stn. 11, Nov.04, 1 at Stn. 10.

The prongworm, *P. remota*, is readily recognisable by its prominent antennae which resemble the prongs of a hay-fork. It is known from shallow sublittoral sandy sediments around the British Isles including the southern North Sea, the English Channel, the Irish Sea, and off the south and west coasts of Ireland. There does not appear to be any previous records from the Clyde Sea Area or from Scottish waters.

Family Aphroditidae

Aphrodita aculeata Linnaeus, 1758 (Sea Mouse)
Loch Eil - Aug.01, Lynn of Lorne: Sound of Shuna, Jun.92, Loch Creran: South Shian - Aug.01, Barcaldine Aug.01, Mull: Tobermory Bay -Aug.01, Scallastle Bay - Jun.94, Inner Firth of Clyde: Gareloch - Apr.09, Greenock, Ironotter Point - May 89, Apr.92, May 95, May 98, Cloch Point - Apr.93, Mar.96, Apr.99, May 2000, Mar.02, Apr.03, Apr.04, Apr.05, Oct.07, Rothesay - Jun.01, North of Cumbrae - Apr.93, Irvine Bay - Sep.89, Oct.92, Oct.99, Oct.03, Kilbrannan Sound - Nov.04, Gigha: Druimyeon Bay - Oct.93, Campbeltown Loch - Jan.01, Nov.04, Loch Ryan - Oct.91, Sep.92, Oct.94, Nov.96.

Aphrodita aculeata is known as the "sea mouse" and is unmistakeable with beautiful iridescent hairs along its flanks. The adults can attain lengths of 15cm or more. Immature specimens also have a distinctive brush-like appearance and most of the records above refer to juvenile specimens, only a few millimetres in length, recovered from grab samples. *A. aculeata* is widely distributed around the Scottish coasts.

Family Polynoidae

Adyte pellucida (Ehlers, 1864)
Inner Firth of Clyde: Greenock, Ironotter Point - May 95, 2 at Stn. H750, Cloch Point - May 99, 1 at Stn. CMT7, May 2000, 1 at Stn. CMT7, Cumbrae: Ballochmartin Bay - Nov.90, several on "clam spat bags", Irvine Bay - Sep.89, 1 at Stn. P.

The cusped neurochaetae help distinguish this species (along with its sibling *A. assimilis*). Both species were recorded in the Clyde Sea Fauna although Tebble & Chambers (1982) were unable to confirm this. Some of the *A. pellucida* material from Ballochmartin Bay has since been confirmed by Susan Chambers. Elsewhere in Scotland *A. pellucida* has been found in the Shetlands, the Outer Hebrides, and Loch Eil.

Alentia gelatinosa (M.Sars, 1835)
Loch Creran: South Shian - Aug.01, 1 at Stn. 5, Cumbrae: Ballochmartin Bay - Nov.90, several on "clam spat bags", Irvine Bay - Sep.89, 1 at Stn. P.

The prominent flap over the posterior part of the prostomium is diagnostic for this species. Although SEPA records are few, Tebble & Chambers (1982) describe it as common in Scottish waters.

Antinoella finmarchica (Malmgren, 1867)
Inner Firth of Clyde, Cloch Point - Apr.04, 1 at Stn. CMT7.

The single specimen comprises an anterior fragment 4mm long (for 10 setigers) retaining only one anterior

scale. This specimen was referred to *A. finmarchica* (Syn. *A. sarsi*) by S. Chambers although some confusion remains about the status of this species. In Scottish waters it is known only from Loch Etive and the Firth of Lorne.

Enipo elisabethae McIntosh, 1900
Irvine Bay - Sep.89, 1 at Stn. C (confirmed by S. Chambers), 1 at Stn. R2, Aug.95, 1 at Stn. I.
These are the first confirmed records from the Clyde Sea Area.

Enipo kinbergi Malmgren, 1865
Greenock: Ironotter Point - May 89, 1 at Stn. B2, 1 at Stn. F1, Firth of Clyde - Jun.07 - 1 at East of Toward Point (UIFM2), Irvine Bay - Sep.79, 1 at Stn. H (deposited Nat. Mus. Scot. 1995), Apr.05, 1 at Stn. H, Rothesay – Jun.09, 1 at Creamery Stn. 100ms.

These two *Enipo* species are very similar with only the occurrence of some bidentate neurochaetae in anterior setigers separating them. In *E. elisabethae* the neuropodia of first 20 or so parapodia each have about a dozen strongly bifid chaetae and just a few chaetae with finely pointed tips. In *E. kinbergi* all the neurochaetae have finely pointed tips. The chaetae tips are often covered with detritus or broken making specific confirmation difficult. However, prior to Tebble & Chambers (1982), the standard text used to identify British scaleworm polychaetes (Fauvel, 1923) did not recognise *E. elisabethae* as a separate species and consequently its occurrence has probably been overlooked. Previous confirmed records for *E. elisabethae* are only from St. Andrews (the type locality) and Loch Glencoul, North West Scotland (see McIntyre, 1961). *E. kinbergi* was confirmed from the Clyde Sea Area by Tebble & Chambers (1982).

Gattyana cirrhosa (Pallas, 1766)
Loch Eil - Aug.01, North Loch Linnhe - May 02, Lynn of Lorne: Sound of Shuna - Jun.92, Loch Creran: Barcaldine - Jun.97, South Shian - Aug.01, Mull: Fishnish Bay - Jun.90, Scallastle Bay - Jun.94, Tobermory Bay - Aug.01, Loch Sween - Jun.90, Loch Craignish - Jun.90, Loch Fyne: Meall Mhor - Aug.93, Greenock: Ironotter Point - Apr.92, May 95, May 98, Gareloch - Oct.98, Holy Loch - Apr.92, Cloch Point - Aug.93, Mar.96, Apr.99, May 2000, Apr.04, May 06, Jun.07, North of Cumbrae - Aug.93, Mar.02, Rothesay - Jun.01, Irvine Bay - Sep.89, Oct.92, Aug.95, Apr.99, Oct.99, May 2000, Apr.01, Oct.03, Jun.06, Ayr Bay - Sep.89, Girvan - Aug. 2000, Campbeltown Loch - Jan.01, Nov.04, Loch Ryan - Oct.94, Aug.97, Aug.04.

G. cirrhosa is widely distributed in Scottish waters. Although described by Clark (1960) as "not common" in the Clyde Sea Area, SEPA surveys suggest this is one of the commonest species of sublittoral scaleworms. Clark's (1960) referral to second "*Gattyana sp.*" in Clyde waters has never been substantiated and is likely to be erroneous. The scale colouration of *G. cirrhosa* with the central dark spot (see front cover of Tebble & Chambers, 1982) is quite typical. The presence of quadrefid or quinquefid tubercles on the elytra can lead to some initial confusion with *Harmothoe antilopes*. Juvenile *Harmothoe impar* which have only a few weakly bidentate neurochaetae may also be confused with *G. cirrhosa* (which has unidentate neurochaetae only). *G. cirrhosa* appears to harbour more than its fair share of parasites and commensal epizoans (see below).

Harmothoe antilopes McIntosh, 1876
Cloch Point - Apr.05, Feb.07, Irvine Bay - Sep. 89, Ayr Bay - Sep. 81 (conf. S.Chambers), Garroch Head - Nov. 2000, Kilbrannan Sound - Nov.04.

The prostomial peaks are poorly developed and may be difficult to discern. However the floret tubercles on the scales help distinguish this species. Although the tubercles on *G. cirrhosa* are quite similar, it has well developed prostomial peaks, only unidentate neurochaetae, and both stout and capillary notochaetae. In Scottish waters *H. antilopes* is known from the Outer Hebrides and the Moray Firth. There are no previous records from the Clyde Sea Area although it does occur nearby in the Irish Sea.

Harmothoe extenuata (Grube, 1840)
Cloch Point - Mar.96, 1 at Stn.CMT7 (conf. S.Chambers), Port Glasgow - Jun.01, 3 at Stn. 18 miles.

This species is widely distributed on Scottish shores. The key in Tebble & Chambers (1982) highlighted the lack of scales on posterior segments. However the posterior portions of scaleworms fixed in formaldehyde are often broken off. The key in Chambers & Muir (1997) focuses on features of the scales themselves but *H. extenuata* may still be confused with *H. impar*. For these reasons *H. extenuata* has probably been under-recorded in SEPA surveys.

Harmothoe fragilis Moore, 1910
Loch Ryan - Jul.08, 1 at Stn. WQ7.

The single specimen which had retained only a single scale with macrotubercles was determined by S. Chambers. In European waters *H. fragilis* is previously known only from the Skagerrak and off the Isle of Man. The specimen above is the first from Scottish waters. However, as this species is easily confused with *H. impar*, it may have previously been overlooked and is probably more widespread than the few records suggest. Some question remains over the validity of this taxon in European waters as few specimens have been examined. A more detailed re-description is required to help properly distinguish it from *H. impar* (S. Chambers *pers.comm.* 2008).

Harmothoe imbricata (Linnaeus, 1767)
Loch Creran: South Shian - Aug.01, Loch Fyne: Meal Mhor - 1989 on oysters, Rothesay - Jun.01, Irvine Bay - Sep.81, Oct.87, (conf. S.Chambers), Jun.06, Campbeltown – Nov.04, Aug.94, Loch Ryan - Oct.91, Oct.94, Nov.96, Sep.99.

One of the commonest scaleworms on Scottish shores. Chambers & Muir (1997) do not illustrate the macrotubercles which may occur in this species. The specimens from Loch Fyne have rows of cylindrical macrotubercles along the edge of their scales (Fig.1), similar to those depicted by Jirkov (2001, p.156). Barnich & Fiege (2000) also show macrotubercles on *H. imbricata* but with pointed (not rounded) tips.

Harmothoe impar (Johnston, 1839)
Loch Creran: Barcaldine - Jul.99, South Shian - Aug.01(conf. S.Chambers), Mull: Tobermory Bay - Aug.01, Sound of Jura – May 06, Jun.07, Greenock: Ironotter Point - May 89, Apr.92, May 95, Gareloch - Oct.98(conf. S.Chambers), Cloch Point - Apr.93, Mar.96, May 2000, Apr.04, Irvine Bay - Sep.81 (conf. S.Chambers), Sep.89, Oct.90, Oct.92, Aug.94, Aug.95, Oct.98, Oct.03, Nov.04 (conf. S.Chambers), Jun.06 Ayr Bay - Sep.89, Kilbrannan Sound – Nov.04, Girvan - Aug.98, Aug. 2000, Oct.02, Campbeltown Loch - Jan.01, Nov.04 (conf. S.Chambers), Loch Ryan - Aug.04.

Although *H. impar* is common on Scottish shores and is already known from the Clyde Sea Area, it is easily confused with other scaleworms. Juveniles can be confused with *G. cirrhosa,* while mature specimens can be also confused with *H. extenuata* or *H. fragilis* which have similar macrotubercles on the scales. It is possible that some of the records above may actually refer to these latter species. Barnich & Fiege (2000) suggested that grouping of the microtubercles on mounds on the scales of *H. impar* may help distinguish it from other *Harmothoe* species where the microtubercles are individually isolated. However grouping of the microtubercles does not appear to be obvious in Scottish *H. impar* material.

Harmothoe pagenstecheri Michaelsen, 1896
Cumbrae: Ballochmartin Bay - Nov.90.

Around a dozen large specimens (2-3cm long) were collected from "clam spat bags". *H. pagenstecheri* is unmistakeable with the enlarged ornate macrotubercles on the scales (Figs. 2, 3). It was previously considered a variety of *H. impar* until Chambers & Muir (1997) recognised its status as a distinct species. Hence some old published records of *H. impar* may include *H. pagenstecheri.* It has not been recovered in routine grab sampling and thus does not seem to be common in the Clyde Sea Area. However it may perhaps be more prevalent on hard substrates which have been rarely sampled for this study.

Harmothoe spinifera (Ehlers, 1864)
Loch Ryan – Aug.97, 3 at Stn. 7.
Irvine Bay - Jun.06, 1 at Stn. 5.

The material from Loch Ryan was not retained and the identity was not confirmed. The single specimen from Irvine Bay comprised an anterior portion with two scales (now detached) and was confirmed by S. Chambers. In Scottish waters *H. spinifera* is known only from Shetland. Clark's (1960) record from the Clyde Sea Area was referred to *Harmothoe (Malmgrenia) furcosetosa* by Tebble & Chambers (1982). The new record here indicates that *H. spinifera* does indeed occur in the Clyde Sea Area but it does not appear to be common.

Lepidonotus squamatus (Linnaeus, 1758)
Loch Creran: South Shian - Aug.01, Port Glasgow - Apr.93, Greenock: Ironotter Point - Apr.92, May 95, Cloch Point - May 2000, Apr.04, Rothesay Jun.01, Irvine Bay - Sep.89, Aug.95, Loch Ryan - Sep.90, Oct.91, Sep.92, Oct.93, Oct.94, Nov.95, Nov.96, Aug.97, Aug. 2000.

A common species in Scottish coastal waters. The number and form of the scales make this one of the easiest of scaleworms to identify.

Malmgrenia andreapolis McIntosh, 1874
North Loch Linnhe - May 02, Irvine Bay - Sep.81, Sep.89, Aug.95, Apr.99, Apr.01, Mar.02, Oct.03, Apr.04, Nov.04, Apr.05, Garroch Head - Nov.04, Kilbrannan Sound - Nov.04, Campbeltown Loch - Jan.01.

This species, which often has a conspicuous dark ring pattern on the scales (Fig. 4), is sometimes confused with *M. arenicolae* and *M. marphysae* which may be similar in appearance. In Scottish waters *M. andreapolis* is known from St. Andrews, Fife, and the Clyde. According to Chambers & Muir (1997) it may inhabit the burrows of Sea Cucumbers (*Labidoplax* and *Leptosynapta*). Although the routine sieving of mud samples would break up holothurian burrows and separate any scaleworms, in all of the above surveys these holothurians were frequently found in the sieve residue of same samples as *M. andreapolis*.

Malmgrenia arenicolae (Saint-Joseph, 1888)
Greenock: Ironotter Point - Apr.92 (conf. S. Chambers), Cloch Point - May 2000, Rothesay - Jun.01, Irvine Bay - Aug.95, Oct.03, Girvan - May 01 (coll. J. Hunter), Oct.02, Campbeltown - Jan.01(conf. S.Chambers), Nov.04.

This and the preceding species have previously been confused with *M. lunulata* which appears to be restricted to the Mediterranean (Barnich & Fiege, 2001). The first confirmed finds from the Clyde Sea Area originate from Clark & Dawson (1963) under the name "*Harmothoe joubini*". Elsewhere in Scotland it has been confirmed from St. Andrews but is likely to be more widespread. *M. arenicolae* is known to inhabit burrows or tubes of polychaetes sueh as *Arenicola marina* or *Neoamphitrite figulus*. One of the above specimens, collected from Irvine Bay in 1995, was found inside the tube of a Sand Mason worm (*Lanice conchilega*), while another from Ironotter Point in 1998 was found in the tube of *Amphitrite cirrata*. These latter scaleworms are deposited in the National Museum of Scotland (NMSZ.1998.063).

Malmgrenia castanea McIntosh, 1876
Sound of Jura – Aug.10, 1 at Stn. 10km W. of Bellochantuy Bay (conf. S.Chambers).

In Scottish waters *M. castanea* is previously known only from Shetland and the Moray Firth. It is very similar to *M. arenicolae*. They are distinguished by the secondary tooth on the neurochaeta. In *M. arenicolae* the tooth is conspicuous, while in *M. castanea* the tooth is considerable reduced and often difficult to discern (see Figs. 45 and 49, Tebble & Chambers 1982).

Malmgrenia furcosetosa Loshamn, 1981
Loch Eil - Aug.01, Greenock: Ironotter Point - Apr.92 (conf. S.Chambers), May 98,
Irvine Bay - Sep.89, Oct.92, Sep.98, Oct.98 (conf. S.Chambers).

M. furcosetosa was only recognised as a species in 1981, characterised by its furcate notosetae. However as the chaetal tips are sometimes covered in detritus it is easy to confuse with other *Malmgrenia* species. In Scottish waters it is known from the Firth of Clyde and Loch Etive. Elsewhere it has been recognised from Plymouth and the Skagerrak.

Malmgrenia glabra (Malmgren, 1865)
Sound of Jura – Jun.07, Greenock: Ironotter Point - Apr.92, Cloch Point - Apr.93, Apr.99 (conf. S.Chambers), Irvine Bay - Sep.89, Oct.92, Aug.95, Ayr Bay - Oct 92, Oct.03, Campbeltown Jan.01.

Malmgrenia ljungmani (Malmgren, 1867)
Irvine Bay - Oct.03, 1 at Stn. IVS-100m E. (Conf. S. Chambers)

Chambers & Muir (1997) highlight the similarity of *M. glabra* and *M. ljungmani* and utilise the arrangement of the papillae on the margin of the scales and the curvature of the lower neuropodial chaetae to separate the two species. The shapes of the bifid tips of the neuropodial chaetae, as shown in Tebble & Chambers (1982), may also be a helpful character. In Scottish waters *M. glabra* is known from the Firths of Clyde and Forth and from St. Andrews. *M. ljungmani* has been recorded from the Shetlands, the Outer Hebrides, and St. Andrews. Although only a single specimen of *M. ljungmani* (3mm for 20 setigers) has been observed in this study it has probably been overlooked due to confusion with other *Malmgrenia* species.

Malmgrenia marphysae (McIntosh, 1876)
Loch Creran: Barcaldine Jun.97, Aug.04, South Shian Aug.01, Greenock: Ironotter Point - May 89, Apr.92, May 95, May 98, Gareloch Oct.98, Cloch Point - Apr.93, Apr.99, May 2000, Apr.04, Rothesay Jun.01, Fairlie Dec.90, Irvine Bay - Sep.89, Oct.90, Oct.92 (conf. S.Chambers), Feb.93, Aug.94, Aug.95, Sep.98, Oct.98, Apr.99, Oct.99, May 2000 Apr.01, Apr.03, Oct.03, Jun.06, Ayr Bay Sep.89, Girvan Apr.92 (conf. S. Chambers), Aug.98, Campbeltown Jan.01, Nov.04.

The records above suggest *M. marphysae* is widely distributed in south west Scotland, although Chambers & Muir (1982) cited it only from Loch Eil. It is possible that some of the records here may refer to *M. arenicolae* with which it may be confused. *M. marphysae* is known to associate with a variety of tube dwelling or burrowing invertebrates.

Malmgrenia mcintoshi **Tebble & Chambers, 1982**
Greenock: Ironotter Point - May 95, 1 at C750, 2 at Stn. H750, Irvine Bay – Oct.98, 1 at Stn. 28, Jun.06, 2 at Stn. 9a, Girvan - May 01 (several collected by J. Hunter), Girvan – Sep.05, 2 at Grant's Stn. 10 (conf. S.Chambers).

The anterior fold on the scales of *M. mcintoshi* provides an excellent diagnostic feature. *M. mcintoshi* was only recognised as a distinct species by Tebble & Chambers (1982). Initially it was only confirmed from the Shetlands and the Isle of Man, but Chambers and Muir (1997) extended its known distribution to the Clyde Sea Area (including some of the records above), as well as to the Celtic Sea and Galway Bay. The specimens from Irvine Bay (Jun.06) had a conspicuous light-spotted pattern on the scales (Fig. 5).

Polynoe scolopendrina Savigny, 1822
Loch Ryan - Oct.94, 1 at Stn. 3, 2 at Stn. 4, Loch Creran: South Shian - Aug.01, 1 at Stn.5 (conf. S.Chambers).

P. scolopendrina is usually recognised by the absence of scales on the posterior of the body. Where the posterior is missing the species can be identified by its distinctive neurochaetal bundles which comprise 1 or 2 stout unidentate chaetae (usually uppermost) and below this a number of slightly less robust chaetae with clearly bidentate tips. *P. scolopendrina* is previously known in Scottish waters from Loch Torridon, Loch Maddy in the Outer Hebrides, Loch Creran, and off Cumbrae in the Inner Firth of Clyde.

Family Acoetidae
Panthalis oerstedi Kinberg, 1855
Loch Eil - Jun. 2009, 2 at "Surveillance site"
Loch Linnhe - Aug. 2001, 1 at Stn. "Lismore Deep".
This large scaleworm is easily recognised by the presence of brush-tipped chaetae and distinct pockets on the outer margin of the scales. The above specimens were around 8cm long and were each recovered from a membranous tube in soft mud. *P. oerstedi* is known from the Shetlands, Loch Nevis (see McIntyre, 1961), Loch Etive, Loch Fyne, and off Arran in the Firth of Clyde. The L. Linnhe specimen is deposited in the National Museum of Scotland (NMSZ.2009.135.01).

Family Pholoidae
Pholoe baltica Oersted, 1843 [as *P. inornata* Johnston, 1839 in Chambers & Muir, 1997]

Loch Eil - Aug.01, North Loch Linnhe - Aug.02, Loch Creran: Barcaldine - Jul.99, Aug.01, Aug.04, South Shian - Aug.01, Mull: Tobermory - Aug.01, Sound of Jura – Jun.07, Inner Firth of Clyde: Ardmore - Oct.98, Gareloch Oct.98, Greenock: Ironotter Point - May 98, Cloch Point - Apr.99, May 2000, Mar.02, Apr.03, Apr.04, Apr.05, May 06, Feb.07, Rothesay - Jun.01, Garroch Head - Nov.2000, Irvine Bay - Sep.98, Oet.98, Oct.99, Apr.03, Oct.03, Apr.04, Nov.04, Apr.05, Jun.06, Kilbrannan Sound -Nov.04, Girvan - Aug. 98, Aug. 2000, Oct.02, Campbeltown Jan.01, Nov.04, Loch Ryan - Aug.04.

Pholoe inornata Johnston, 1839 [as *P. synophthalmica* Claparède, 1868 in Chambers & Muir, 1997]
Loch Eil - Aug.01, North Loch Linnhe - May 02, Loch Creran: Barcaldine - Jul. 99, Aug.01, Aug.04, South Shian - Aug.01, Mull: Tobermory - Aug.01, Greenock: Ironotter Point - May 98, Gareloch - Oct.98, Rothesay Jun.01, Garroch Head - Nov.04, Irvine Bay - Oct.98, Oct.99, Oct.03, Nov.04, Jun.06, Girvan - Aug.98, Oct.02, Campbeltown - Jan.01, Nov.04, Loch Ryan - Sep.99, Aug.2000, Aug.04.

There has been considerable nomenclatural confusion regarding *Pholoe* species in UK waters. Chambers (1985) recognised only *P. inornata* and a new eyeless species which she named *P. pallida*. In Chambers & Muir (1997) a third species, *P. synophthalmica,* was separated from *P. inornata*. The following year Petersen (1998) reviewed the nearshore species of *Pholoe* in Northern Europe recognising four valid species from British waters. The "*P. inornata*" of Chambers & Muir (1997) was referred to *P. baltica*, whilst their "*P. synophthalmica*" was regarded as the true *P. inornata* Johnston, 1839. This latter view was subsequently confirmed by Barnich & Fiege (2003). In addition Petersen resurrected another old species, *P. assimilis* Oersted, 1845, which is very similar to *P. inornata*. The present note only includes records from 1998 onwards as older records may be inaccurate.

Surprisingly Clark (1960) only has a single record of *Pholoe* (as "*P. minuta*") from the Clyde Sea Area, while Clark & Dawson (1963) cite nine specimens from Millport under the name "*P. synophthalmica*" and comment in detail on the nomenclatural confusion. Comely (1973) describes "*P. minuta* – form *synophthalmica* Claparède" as frequent at Toment End, Cumbrae. It is evident from the numerous records here that both *P. baltica* and *P. inornata* are widely distributed in the Clyde & Argyll Sea Area. They frequently occur in the same survey areas and sometimes in the same grab samples. The length of the papillae on the scales helps distinguish them. *P. assimilis* has not yet been found in the Clyde Sea Area though it has recently been found in Scottish waters at Kingstone Hudds in the Firth of Forth (Lee Heaney, SEPA South East Area, *pers comm.*). However, as *P. inornata* and *P. assimilis* are very similar, it is possible that the occurrence of the latter species has been overlooked.

Family Sigalionidae
Sigalion mathildae Audouin & Milne-Edwards in Cuvier, 1830
Rothesay - Jun.01, Fairlie - Dec.90, Irvine Bay - Sep.89, Oct.92, Aug.95, Oct.99, Ayr Bay - Sep.89, Oct.92.

A widespread species on Scottish shores. The bipinnate papillae on the scales make this an easy species to identify although a similar species, *S. squamosum*, with fewer pinnules is also now confirmed from North Unst and the Shetlands (Chambers & Muir, 1997).

Sthenelais boa (Johnston, 1833)
Sound of Jura - Jun.07, Rothesay - Jun.01, Irvine Bay - Sep.89, Feb.93, Jun.06, Girvan - Aug.98, Aug.2000, Campbeltown Jan.01, Loch Ryan - Oct.91, Oct.93, Nov.96, Aug.97, Sep.99, Aug.2000, Aug.04.

Sthenelais limicola (Ehlers, 1864)
Loch Eil - Aug.01, Sound of Jura - May 06, Jun. 07, Greenock: Ironotter Point - May 89, Apr.92, North of Cumbrae - Mar.96, Cloch Point - Apr.01, Largs - Dec.90. Irvine Bay - Sep.89, Oct.92, Aug.95, Sep.98, Oct.98, Oct.99, Oct.03, Nov.04, Ayr Bay - Sep.89, Oct.92, Kilbrannan Sound- Nov.04.

Both the above *Sthenelais* species are widespread in Scottish coastal waters. *S. boa* frequently has sand grains adhering to its scales. The notched posterior scales in *S. limicola* act as a quick identification feature. A third species, *S. zetlandica*, which lacks the unjointed spiny neuropodial chaetae, has been recorded from the Shetlands and also from the Irish Sea (Chambers & Muir, 1997).

New records of Parasitic Copepods from Scaleworms in the Clyde an Argyll Sea Area
Two quite different copepod families parasitise scaleworms (see Gotto, 2004). The Nereicolids, represented by the genus *Selioides*, are moderately transformed ectoparasites with recognisable head and body regions with cephalic appendages, including conspicuous maxillipeds and two pairs of legs. The herpyllobiids, on the other hand are grossly transformed mesoparasites with the female divided into two body regions: an irregular shaped endosomal portion inside the host and attached by a stalk to a globular exosomal portion outside the host which is devoid of any appendages. The only indication of their copepodan nature is the presence of a pair of large ovisaes in ovigerous females or the attachment of dwarfed male copepodites to the female genital area. The Herpyllobiids were studied in some detail in a series of papers by Lutzen (1964, 1966, 1968).

New records of parasitic copepods associated with individual scaleworm specimens collected in the area are cited below:

(a) Irvine Bay (1981?), Stn. R2 - *G. cirrhosa* with a single juvenile *Selioides bocqueti* Carton, 1963, attached to the dorsum at setiger 8/9. The juvenile copepod is 0.35mm long and resembles the copepodite "Stage A" figured by Carton (1964). Remnants of a large pair of copepod maxillipeds embedded on the dorsum of the same scaleworm, just behind the prostomium, indicate an adult female copepod had also been attached.

S. bocqueti has been recorded in the southern Irish Sea (O'Reilly, 1995) and off the coast of Northumberland (O'Reilly & Geddes, 2000). A similar species, *S. bolbroei* Levinsen, 1878 was reported from Loch Fyne by Scott in 1901 (under the name *Cancerina confusa*). Scott's single female specimen was found among dredge debris, detached from any host.

In June 1986, two specimens of *S. bolbroei* (an adult and a juvenile female) were recovered by M.O'Reilly attached to a *G. cirrhosa* collected from off St. Abbs (Stn. 27) in the Firth of Forth. The adult female specimen is illustrated *in-situ* in Figure 20 of Chambers & Muir (1997). There are no other records of *S. bolbroei* in British waters, but it is also known from Denmark, Sweden, Iceland, Greenland, Canada, and the Kara Sea (see Bresciani, 1967).

(b) Irvine Bay Sep. 87, Stn. Z - *G. cirrhosa* with 2 ovigerous female *Herpyllobius arcticus* Steenstrup & Lutken, 1861, on posterior parapodia.

This copepod may have previously been recorded in the Clyde Sea Area by Clark (1960), under the name "*Hedyphanella superba*", on the dorsum of a *G. cirrhosa* specimen from Etterick Bay. However see note (d) below for a possible alternative identification. Clark's simultaneous reference to a parasitic copepod attached to the prostomium of the same host specimen undoubtedly refers to *Herpyllobius polynoes* (Kroyer, 1863) which exclusively attaches in this location.

(c) Cloch Point, May 2007, Stn. CMT7 - *G. cirrhosa* with 1 ovigerous female *Eurysilenium truncatum* M.Sars, 1870 (with 2 dwarf males attached to female copepod), on posterior dorsum (setiger 22) of scaleworm host (Fig. 6) .

(d) Cloch Point, May 2007, Stn. CMT7 - *G. cirrhosa* with 1 mature female *Eurysilenium truncatum* M.Sars, 1870 (with 1 dwarf male attached to female copepod), on posterior dorsum (setiger 19) of scaleworm host. This scaleworm also had 2 immature female *Herpyllobius polynoes* attached to the prostomium resembling the example of double parasitism described by Clark (see (b) above). It is possible that Clark's "*Hedyphanella superba*" on the dorsum of *Gattyana* may actually have been *E. truncatum* (rather than *H. arcticus*) as the two species are very similar in appearance.

The two scaleworms from Cloch Point parasitized by *E. truncatum* (and *H. polynoes*) were both collected from a single Day Grab sample. Until now *E. truncatum* has only been observed in Scandinavian waters and the above specimens represent the first confirmed records from British waters. A subsequent find of an ovigerous *E. truncatum* from *G. cirrhosa* collected in the East Shetland Basin was recently presented to the author (Fig.7). Note that the reference in Chambers & Muir (1997) to *E. truncatum* from Plymouth is erroneous.

(e) Garroch Head, Nov.2000, Stn.T7 - *H. antilopes* with an ovigerous female *Herpyllobius polynoes* (Kroyer, 1863), attached to its prostomium. In addition to the record (see (d) above) from *G. cirrhosa* this copepod has also been observed attached to *G. cirrhosa* from the Firth of Forth (see O'Reilly, 1999).

(f) Irvine Bay, Sep.1981, Stn. H - specimen of *M. andreapolis* with an ovigerous female copepod, referred to *Herpyllobius polynoes* (Kroyer, 1863), attached to its prostomium. This specimen is illustrated, in-situ in Figure 34, of Chambers & Muir (1997). Since then three specimens of this copepod have been collected on *M. andreapolis* from the same locality in Irvine Bay. These included another ovigerous female in April 2001 and an ovigerous female and a mature female on a single host in April 2005. Provisional examination of these copepods and similar copepods on *M. andreapolis* in the Firth of Forth, the Solway Firth, and the Irish Sea suggests that the ectosomal body shape differs somewhat from *H. polynoes* and may represent a new species particular to this host. This will be the subject of a subsequent study.

New records of entoprocts and other epizoans associated with Scaleworms in the Clyde and Argyll Sea Area

Records from individual scaleworm specimens are cited below:

a) Garroch Head Sewage Sludge disposal grounds, 1971 – *Gattyana cirrhosa* with 25 entoprocts, *Loxosomella compressa* Nielsen & Ryland, 1961 on chaetae (Fig. 8).
b) Irvine Bay, Sep.89 - *G. cirrhosa* with 13 entoprocts, *Loxosomella harmeri* (Schultz, 1895) and 2 stalked ciliate colonies (cylindrical colony shape resembling *Zoothamnium niveum*) on scales and 20 entoprocts, *Loxosomella compressa* Nielsen & Ryland, 1961 on chaetae.
c) Irvine Bay, Aug.91, Stn.Z - *G. cirrhosa* with 8 hydroid polyps, *Leuckartiara octona* (Fleming, 1823) on posterior scales.
d) Irvine Bay, Aug.95 Stn.H - *G. cirrhosa* with 20 entoprocts, *Loxosomella harmeri* (Schultz, 1895), and 15 stalked ciliate colonies, resembling *Zoothamnium niveum*, (Fig. 9) on scales.
e) Loch Eil, Jun.09, Surveillance site – 3 entoprocts, *Loxosomella glandulifera* Franzén, 1962 recovered from within the tube of *Panthalis oerstedii*.

Entoprocts and other small epizoans are generally over-looked and under-recorded by marine ecologists. *Loxosoma compressa* is known to attach to the chaetae of a variety of polynoid scaleworms (and is also found within *Chaetopterus* tubes) in British waters (Cullercoats and the Isle of Man) as well as Norway and Denmark. *L. harmeri* has a rather similar distribution and occurs on the elytra, antennae, and cirri of polynoid scaleworms (and also in *Chaetopterus* and *Amphitrite* tubes). The entoproct *Loxosomella glandulifera* is previously known only from the Skagerrak and the Kattegat and is newly recorded from British waters. It attaches to the filaments on the inside of its hosts tube. It can be quite difficult to find among the tube filaments and the tube was stained in Rose Bengal solution in order to help highlight any entoprocts present. The hydroid *Leuckartiara octona* and ciliate colonies, such as *Zoothamnium sp.*, are widely distributed and can be found on a variety of substrates.

New records of entoprocts and other epizoans associated with the sea mouse (*Aphrodita aculaeta*) in the Clyde and Argyll Sea Area

In April 2009 during a fish trawling survey in the Gareloch ten adult sea mice were collected to search for associated epizoa. The sea mice ranged in size from 6.5 to 9cm long and were preserved in formosaline before return to the laboratory for microscopical examination. The ventral sole, parapodia, and lateral masses of spines and hairs were checked for epizoans. The dorsal hair mass was cut open along the midline to reveal the large scales and the galleries beneath the scales were searched.

Although Neilsen (1989) highlights three different solitary entoproct species of *Loxosomella* from *A. aculeata*, none of these were observed on the Gareloch specimens. All the specimens had some colonies of the hydroid *Leuckartiara octona* (Fleming, 1823). The hydroid zooids were most abundant ventrally, attached to the fine lateral hairs and to the parapodia. In some sea mice small *L. octona* zooids also occurred on the ventral sole. One sea mouse harboured a small colony (20 zooids) of the bryozoan *Triticella pedicellata* (Alder, 1857) on the underside of one of its scales. Around 20 individual zooids of *T. pedicellata* were also observed scattered on the sole of a second sea mouse (along with numerous individual stalked ciliates). On the sole of a third sea mouse were a few *L. octona* zooids and 2 zooids of the entoproct *Barentsia elongata* (M.Sars, 1835). Finally on the sole of a fourth sea mouse were numerous *L. octona* zooids, around 40 zooids of a small athecate hydroid, about 0.5mm tall (Fig. 10), and 10 zooids of the entoproct *B. elongata*. In addition this sea mouse also had a colony (70 zooids) of the bryozoan *T. pedicellata* on the underside of one of its scales. This last specimen is deposited in the National Museum of Scotland.

The association of the hydroid *Leuckartiara octona* (Fleming, 1823) with *A.aculeata* is well known and was studied in the Clyde Sea Area by Latham (1962). It appears that the sea mouse is infested only in areas with muddy bottoms and Latham suggests that the hydroid planula larvae utilise the bristles of the sea mouse as an appropriate settlement location in an area otherwise devoid of hard substrata. Stechow (1929) and Leloup (1934) highlight a variety of hydroids and other epizoa from *A.aculeata* although of the hydroids only the athecate species *L. octona* and *Hydractinia borealis* (Mayer, 1900) (see Schuchert 2008 for synonymy) seem to occur regularly.

Records of *T. pedicellata* are rather scarce and it is not previously known from *A. aculeata*. Its congener *Triticella flava* Dalyell, 1848, which occurs on the burrowing shrimp *Calocaris macandreae* Bell, 1846, is perhaps better known and has been observed by us on *C. macandreae* from Irvine Bay and from *Nephrops norvegicus* collected near Rothesay.

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Plate 1

(1). *Harmothoe imbricata* – showing cylindrical macrotubercles on posterior edge of scales.

(2). *Harmothoe pagenstecheri* – showing antler-like macrotubercles on posterior edge of scales.

(3). *Harmothoe pagenstecheri* – showing ovoid macrotubercles on posterior edge of scales.

(4). *Malmgrenia andreapolis* – showing conspicuous dark ring pattern on scales.

(5). *Malmgrenia mcintoshi* – showing conspicuous light-spotted pattern on scales.

(6). Parasitic copepod, *Eurysilenium truncatum*, ovigerous female attached to *G. cirrhosa* from off Cloch Point in the Firth of Clyde (Ov.= Ovisac, Co.= Copepod).

(7). Parasitic copepod, *Eurysilenium truncatum*, ovigerous female attached to *G. cirrhosa* from East Shetland Basin (Ov.= Ovisacs, Co.= Copepod).

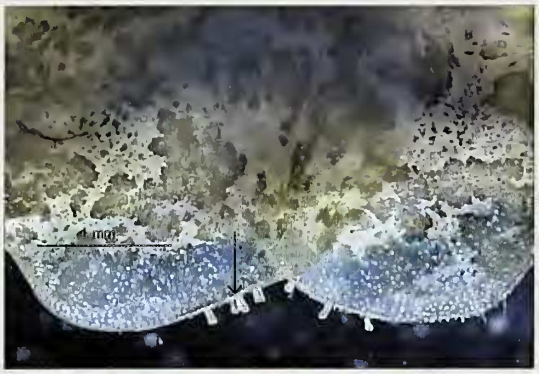
(8). Entoproct, *Loxosomella compressa* (= L.c.), attached to neurochaeta of *G. cirrhosa* from Garroch Head disposal grounds.

(9). Ciliate colonies, *Zoothamnium niveum*?, attached to scales of *G. cirrhosa* from Irvine Bay.

(10). Small athecate hydroid from sole of *Aphrodita aculeata*, collected in the Gareloch.

Plate 1

1



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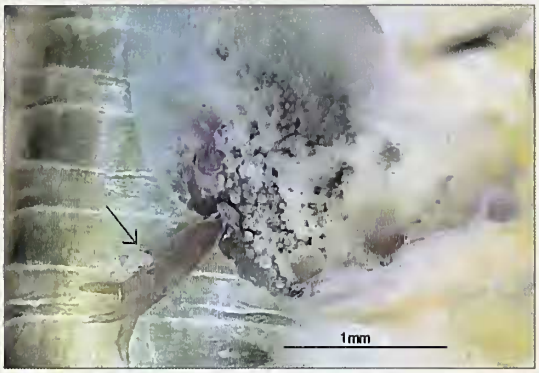

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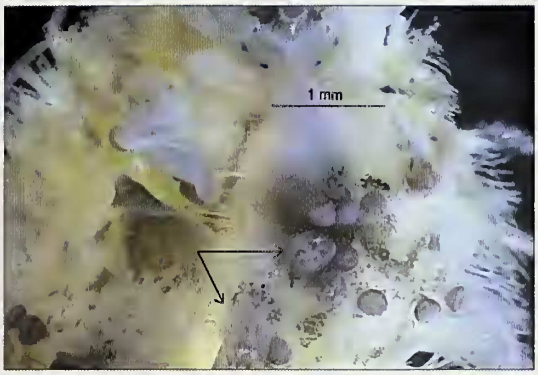

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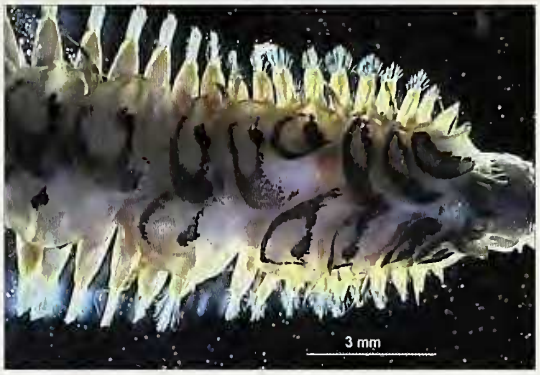

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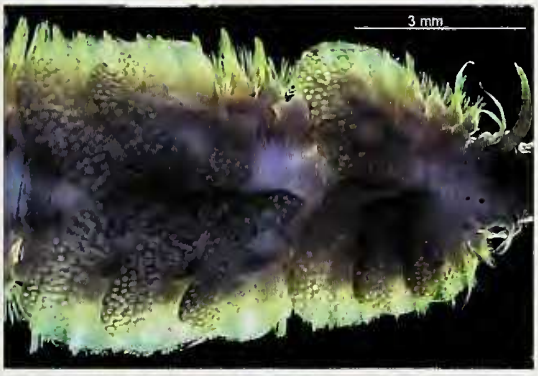

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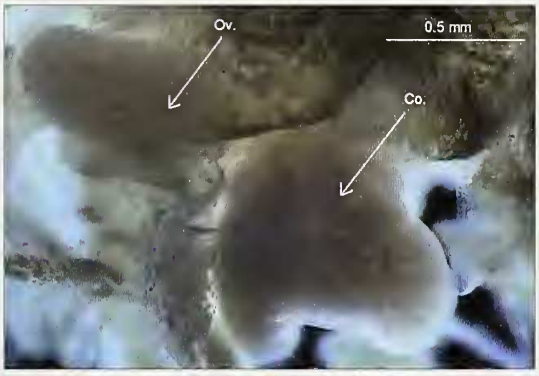

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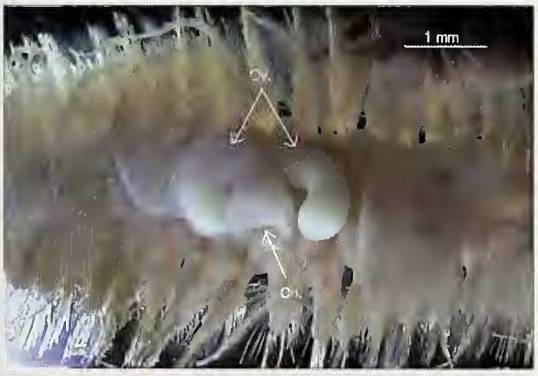

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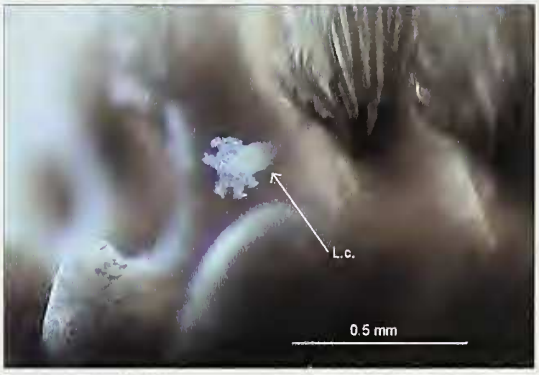

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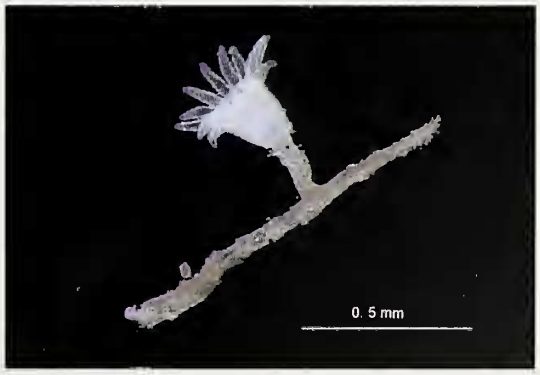

Appendix 1. Station Details (arranged by survey area approximately North to South)

Loch Eil, Surveillance site, 56°50.93'N, 05°14.73'W, depth 36m
Loch Linnhe, Lismore Deep, 56°34.80'N, 05°28.30'W, depth 109m
Loch Creran, South Shian, Stn. 5, 56°31.25'N, 05°23.86'W, depth 7m
St. Abbs Head (Forth Sea Area), Lothian Region Council disposal grounds, Stn. 27 - 56°05.91'N, 02°04.72'W, depth 52m
Kingstone Hudds, Firth of Forth, 56 °07.44' N, 02 °55.92' W, depth 40m.
Port Glasgow, Stn. 18 miles, 55°56.28'N, 04°40.26'W, depth 8m
Cloch Point, Stn.CMT7, 55°56.85'N, 04°53.65'W, depth 81m
Greenock, Ironotter Point, Stn. B2, 55°58.50'N, 04°48.81'W, depth 28m
Greenock, Ironotter Point, Stn. F1, 55°58.30'N, 04°48.13'W, depth 20m
Greenock, Ironotter Point, Stn. C750, 55°58.73'N, 04°48.30'W, depth 25m
Greenock, Ironotter Point, Stn. H750, 55°57.99'N, 04°48.71'W, depth 25m
Firth of Clyde, East of Toward Point (UIFM2), 55°52.08'N, 04°56.70'W, depth 37m
Rothesay Creamery, Stn. 100ms, 55°50.62'N, 05°01.24'W, depth 28m
Garroch Head, Stn. T7, 55°38.82'N, 05°01.45'W, depth 139m
Irvine Bay, Stn. C, 55°33.60'N, 04°43.95'W, depth 36m
Irvine Bay, Stn. H, 55°35.92'N, 04°47.40'W, depth 38m
Irvine Bay, Stn. I, 55°36.72'N, 04°46.55'W, depth 29m
Irvine Bay, Stn. P, 55°35.30'N, 04°44.45'W, depth 25m
Irvine Bay, Stn. R1, 55°34.05'N, 04°40.55'W, depth 9m
Irvine Bay Stn. R2, 55°33.88'N, 04°41.65'W, depth 13m
Irvine Bay, Stn. Z, 55°34.75'N, 04°45.20'W, depth 40m
Irvine Bay, Stn. 5, 55°35.19'N, 04°41.40'W, depth 6m
Irvine Bay, Stn. 9a, 55°34.90'N, 04°41.49'W, depth 6m
Irvine Bay, Stn. 28, 55°35.43'N, 04°41.88'W, depth 6m
Irvine Bay, Stn. 19, 55°35.24'N, 04°41.59'W, depth 6m
Irvine Bay, Stn. IVS - 100m E, 55°34.88'N, 04°42.99'W, depth 6m
Sound of Jura, Stn. 10km W.of Bellochantuy Bay, 55°31.735'N, 05°52.217'W, depth 67m
Campbeltown, Stn. 8, 55°25.65'N, 05°34.03'W, depth c.3m
Campbeltown, Stn. 10, 55°25.69'N, 05°33.96'W, depth c.3m
Campbeltown, Stn. 11, 55°25.61'N, 05°33.98'W, depth c.3m
Girvan, Grant's Stn. 10, 55°16.152'N, 04°51.431'W, depth c.10m
Girvan, Grangestone, Stn. 1, 55°15.43'N, 04°51.67'W, depth e.5m
Girvan, Grangestone, Stn. 2, 55°15.92'N, 04°51.63'W, depth c.5m
Girvan, Grangestone, Stn. 3, 55°15.70'N, 04°51.73'W, depth c.5m
Girvan, Grangestone, Stn. 5, 55°15.60'N, 04°51.68'W, depth c.5m
Girvan, Grangestone, Stn. 6, 55°15.52'N, 04°51.67'W, depth c.5m
Girvan, Grangestone, Stn. 7, 55°15.63'N, 04°51.32'W, depth c.5m
Girvan, Grangestone, Stn. A2, 55°15.41'N, 04°51.92'W, depth c.10m
Girvan, Grangestone, Stn. B2, 55°15.52'N, 04°51.84'W, depth c.10m
Girvan, Grangestone, Stn. C2, 55°15.63'N, 04°51.84'W, depth c.10m
Loch Ryan, Stn. WQ7, 54°58.44'N, 05°02.24'W, depth 10m
Loch Ryan, Stn. 3, 54°55.15'N, 05°00.96'W, depth c.5m
Loch Ryan, Stn. 4, 54°55.30'N, 05°00.67'W, depth c.5m
Loch Ryan, Stn. 7, 54°55.20'N, 05°00.55'W, depth c.5m